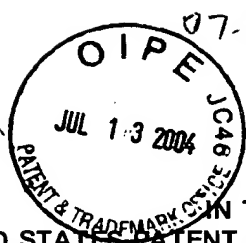


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07-15-04 DT02 Rec'd PCT/PTO 13 JUL 2004 AF/1743 \$

PATENT APPLICATION

ATTORNEY DOCKET NO. 10003512-1

IN THE  
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): William D. Fisher

Serial No.: 09/771,092

Examiner: Brian R. Gordon

Filing Date: 01-26-2001

Group Art Unit: 1743

Title: FLUID DROP DISPENSING

ASSISTANT COMMISSIONER FOR PATENTS  
PO Box 1450  
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Sir:

Transmitted herewith in triplicate is the Appeal Brief in this application with respect to the Notice of Appeal filed on May 13, 2004.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) \$330.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

( ) (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d) for the total number of months checked below:

( ) one month	\$110.00
( ) two months	\$420.00
( ) three months	\$950.00
( ) four months	\$1480.00

( ) The extension fee has already been filled in this application.

(X) (b) Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account 50-1078 the sum of \$330.00. At any time during the pendency of this application, please charge any fees required or credit any overpayment to Deposit Account 50-1078 pursuant to 37 CFR 1.25.

(X) A duplicate copy of this transmittal letter is enclosed.

(X) I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450.  
Date of Deposit: 07-13-2004 EV33381539 US

I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.

( ) Date of Facsimile:

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Signature: Donna Macedo

Respectfully submitted,

William D. Fisher

By

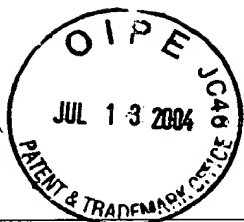
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<b>APPELLANTS' BRIEF</b>  Address to: Mail Stop Appeal Brief-Patents Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450	Attorney Docket	10003512-1
	First Named Inventor	Fisher, William D.
	Confirmation Number	7692
	Application Number	09/771,092
	Filing Date	January 26, 2001
	Group Art Unit	1743
	Examiner Name	Gordon, Brian R.

Sir:

This Brief is filed in support of Appellants' appeal from the Examiner's Rejection dated February 23, 2004. No claims have been allowed, and claims 1-14 and 35-42 are pending. Claims 27-34 have been withdrawn from consideration. Claims 1-14 and 35-42 are appealed. A Notice of Appeal was filed on May 13, 2004.

The Board of Appeals and Interferences has jurisdiction over this appeal pursuant to 35 U.S.C. §134.

The Commissioner is hereby authorized to charge deposit account number 50-1078, reference no. 10003512-1, in the amount of \$330.00 to cover the fee required under 37 C.F.R. §1.17(c) for filing Appellants' brief. In the unlikely event that the fee transmittal or other papers are separated from this document and/or other fees or relief are required, appellants petition for such relief, including extensions of time, and authorize the Commissioner to charge any fees under 37 C.F.R. §§ 1.16, 1.17 and 1.21 which may be required by this paper, or to credit any overpayment, to deposit account number 50-1078, reference no. 10003512-1.

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#### **REAL PARTY IN INTEREST**

The inventors named on this patent application assigned their entire rights to the invention to Agilent Technologies, Inc.

#### **RELATED APPEALS AND INTERFERENCES**

There are currently no other appeals or interferences known to Appellant, the undersigned Appellants' representative, or the assignee to whom the inventors assigned their rights in the instant case, which would directly affect or be directly affected by, or have a bearing on the Board's decision in the instant appeal.

#### **STATUS OF THE CLAIMS**

The present application was filed on January 26, 2001 with claims 1-26. Claims 1-26 were subjected to a restriction requirement and on February 27, 2003 a provisional election was made with traverse to prosecute the invention of Group I, Claims 1-14. During prosecution of the application, Claims 15-26 were cancelled and new Claims 27-42 were added. On October 22, 2003, newly submitted Claims 27-34 were withdrawn from consideration as being directed to a non-elected invention. Accordingly, Claims 1-14 and 35-42 are pending in the present application and are appealed herein.

All of the pending Claims 1-14 and 35-42 shown in the attached Appendix remain pending, rejected, and appealed herein.

#### **STATUS OF AMENDMENTS**

During the course of prosecution, amendments were filed on July 22, 2003, amending Claims 1 and 11, canceling Claims 15-26 and adding new Claims 27-42, which amendments were entered. Amendments were filed on December 18, 2003, amending Claims 35 and 36 and withdrawing Claims 27-34. Thus, Claims 1-14 and 35-42 are pending and appealed, which claims are recited in the attached Appendix.

#### **SUMMARY OF THE INVENTION**

The claims on appeal are generally directed to methods that include dispensing drops from a pulse jet and striking the pulse jet. Independent Claims 1, 27 and 37, and the claims that depend therefrom,

specify methods of dispensing drops from a pulse jet and striking the pulse jet at least once. Independent Claims 11, 31 and 39, and the claims that depend therefrom, specify methods of fabricating an array of chemical moieties on a substrate and include dispensing drops from a pulse jet onto the substrate and intermittently striking the pulse jet multiple times. Claim 4 specifies that the housing of a device is struck in the same direction in which drops are ejected from the pulse jet, Claims 5-6 specify particular strike rates, Claims 7-8 specify that the striking delivers particular amounts of energy, Claims 12 and 40 specify a method wherein multiple strikes are applied between the dispensing of the drops by the pulse jet, and Claims 35 and 36 specify that the striking improves pulse jet firing reliability relative to pulse jet firing absent striking.

## ISSUES

There are three issues on appeal, as follows:

- I. WHETHER CLAIMS 1, 11, 31, 35 AND 36 COMPLY WITH THE REQUIREMENTS OF 35 U.S.C. §112, SECOND PARAGRAPH;
- II. WHETHER CLAIMS 1-12 AND 36-40 ARE OBVIOUS UNDER 35 U.S.C. §103(a) OVER BARES ET AL. (US 5,023,625) IN VIEW OF CLARK ET AL (US 5,536,471); AND
- III. WHETHER CLAIMS 13-14 AND 41-42 ARE OBVIOUS UNDER 35 U.S.C. §103(a) OVER BARES ET AL. (US 5,023,625) IN VIEW OF CLARK ET AL (US 5,536,471) IN FURTHER IN VIEW OF ELLSON ET AL. (US 6,548,408).

## GROUPING OF THE CLAIMS

The grouping of claims is as follows, where each group is considered by Appellant to be separately patentable. The groups do not stand or fall together.

- Group I: Claims 1-3, 9-11, 13-14 and 37-39 and 41-42 stand or fall together;
- Group II: Claim 4;
- Group III: Claim 5-6;
- Group IV: Claim 7-8;
- Group V: Claims 12 and 40 stand or fall together; and
- Group VI: Claims 35-36 stand or fall together.

The claims of each distinct group as described above are properly evaluated separately for the purposes of this appeal. The groups of claims do not stand or fall together because specific elements are recited in the claims of the disparate groups that distinguish them from the claims of the other groups with respect to the rejections raised by the Office. For example, Claims 35 and 36 are properly grouped separately from the remaining claims because a 35 U.S.C. §112, second paragraph rejection has been raised against these claims that has not been raised against the other claims. Furthermore, independent Claims 1, 11, 37 and 39 specify a method of dispensing drops from a pulse jet and striking the pulse jet, which elements are not taught or suggested in the cited references. Dependant claims specify specific elements that further limit the scope of the independent claims, which elements are not taught or suggested in the cited references. For example, Claim 4 specifies a particular direction of striking with respect to the housing of the device, Claims 5 and 6 specify particular strike rates, Claims 7 and 8 specify particular amounts of energy delivered from each strike, Claims 12 and 40 specify applying multiple strikes between the dispensing of drops, and as noted above, Claims 35 and 36 specify improvement of pulse jet firing reliability from the striking. The rejections of these groups are properly considered separately for purposes of this appeal.

## **ARGUMENTS**

The arguments portion of this Brief is divided into two sections. The first section describes Appellants' understanding of the Examiner's rejections. The second section specifically addresses the three issues outlined above relating to compliance of the claimed invention with the requirements of 35 U.S.C. §112, second paragraph and the non-obviousness of the invention over Bares et al. in view of Clark et al., and in further view of Ellson et al.

### **I. THE EXAMINER'S REJECTIONS**

#### A. Rejection under 35 U.S.C. §112, second paragraph

Claims 1, 11, 31 and 35-36 were rejected under 35 U.S.C. §112, second paragraph as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Appellants regard as the invention. Appellants note that in the amendment dated December 18, 2004, Claim 31 was withdrawn from consideration.

In support of this rejection, the Office argued that Claims 1, 11 and 31 (currently withdrawn from consideration) are directed to a method of dispensing. The Office asserts that it is unclear what occurs or what is the significance of striking the device. The Office argues that the claims are so broad that it is unclear what is the intent and purpose of each step given in the claims and therefore it would be difficult for one to practice the invention as claimed with the intentions as disclosed in the specification.

In regards to Claims 35 and 36, the Office argues that the term “improves pulse jet firing reliability” is a relative term which renders the claim indefinite. The Office asserts that the term “improves” is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of skill in the art would not be reasonably apprised of the scope of the invention. The Office further asserts that the claim is not directed to any quantification standard for which one to compare the reliability of the device and it would be relative to one’s personal view if striking improves reliability.

In rejecting Claims 35 and 36, the Office acknowledges Appellants’ claim amendments that specified that the striking improves pulse-jet firing reliability relative to pulse jet firing reliability absent striking, and argues that such amendments do not overcome the rejection of the claims assertedly because a numerical standard by which to determine improved reliability is not provided in the specification or the claims.

B. Rejection under 35 U.S.C. §103(a) over Bares et al. in view of Clark et al.

Claims 1-12 and 35-40 were rejected under 35 U.S.C. §103(a) as being unpatentable over Bares et al. in view of Clark et al.

In support of this rejection, the Office argued that Bares et al. discloses an invention to overcome the inability of the natural ink feed capillary action to adequately supply ink to an ink jet printhead during high frequency operation.

The Office relies on the invention of Clark et al. to make-up for the deficiencies of Bares et al. with respects to striking. The Office describes the invention of Clark et al. as a bubble flushing device for aspirating and dispensing fluids. In relying on Clark et al., the Office reiterates a description of the Background Section of Clark et al. that notes that it is known that “clinical analyzers require that fluids be aspirated and dispensed with precision and volumetric accuracy. The performance of prior syringes used for aspirating and dispensing fluids is severely degraded by the presence of air bubbles in the

syringe and remaining portion of the fluidic system. Existing syringes fail to provide means for effectively removing such bubbles from the fluidic system. For example, the cumbersome manual practice of tapping the syringe to remove bubbles is well-known. Thus, there is a need to provide a syringe for aspirating and dispensing fluids through the open ended of the tip of a pipettor with precision and volumetric accuracy as a result of its ability to automatically flush bubbles out of the fluidic system.””

The Office concludes that “[i]t would have be obvious to one of skill in the art to modify the invention of Bares et al. by employing the teachings of Clark et al. and striking or tapping the syringe to remove bubbles in order to provide for accurate and precise dispensing of fluids.”

C. Rejection under 35 U.S.C. §103(a) over Bares et al. in view of Clark et al. and in further view of Ellson et al.

Claims 13-14 were rejected under 35 U.S.C. §103(a) as being unpatentable over Bares et al. in view of Clark et al. and in further view of Ellson et al.

In support of this rejection, the Office acknowledge that Bares et al. in view of Clark et al. do not disclose a device for DNA arrays and asserts that this deficiency is provided by Ellson et al.

## **II. APPELLANTS' RESPONSE TO THE REJECTIONS**

A. Claims 1, 11, 31 and 35-36 are definite and clear and meet the requirements of 35 U.S.C. §112, second paragraph

i. Claims 1 and 11 are clear and definite under 35 U.S.C. §112, second paragraph

Claims 1, 11, 31 were rejected under 35 U.S.C. §112, second paragraph as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Appellants' regard as the invention. In the amendment dated December 18, 2003, Claim 31 was withdrawn. In support of the rejection of Claims 1 and 11, the Office asserts that the claims are indefinite because they do not specify what occurs or what is the significance of striking the device.

The law is clear that “[i]f the claims, read in the light of the specification, reasonably apprise those skilled in the art both of the utilization and scope of the invention, and if the language is as precise



as the subject matter permits, the courts can demand no more.” North American Vaccine, Inc. v. American Cyanamid Co. 28 USPQ 2d 1333, 1339 (Fed. Cir. 1993), cert. denied, 114 S. Ct. 1645 (1994).

Appellants submit that the specified “striking the pulse jet” is clear and definite and one of skill in the art would have no difficulty in understanding this term. One of skill in the art would recognize that striking the pulse jet refers to the act of making physical contact with the pulse jet in a manner to provide an impulse force to the pulse jet. This is repeatedly made clear in the instant specification. For example, in reference to certain embodiments the specification describes that “...the housing is struck on a surface (such as an outside surface) with the member.” (page 3, lines 21-22) and “...when housing 212 is struck in the manner described, it is mechanically displaced slightly from its resting position by the delivered impulse force.” (page 8, lines 8-10). Accordingly, there is no ambiguity as to the meaning of the rejected claims.

The Office is improperly requiring that Appellants recite a mechanism of action of the striking recited in Claims and 11 and asserts that such is necessary in order for the claims to be understandable. However, as is well established in the law, an understanding of the precise scientific mechanism by which a process works is not essential for patentability. According to the law, the precise mechanism by which the claim-recited striking works should not be essential for the patentability of the rejected claims. In fact, it has long been held that an inventor need not even understand the principle of his invention as long as it works. (See for example, Philip Morris, Inc. v. Brown & Williamson Tobacco Corp., 641 F. Supp. 1438, 1483 n.13, 231 USPQ 321, 355 n.13 (M.D. Ga. 1986), supplemental opinion, 645 F. Supp. 174 (1986) (“understanding of the precise scientific mechanism by which the process works is not essential to patentability because scientific principles and natural phenomena are not patentable”).

Accordingly, for at least the reasons described above, Claims 1 and 11 are clear and definite in regards to the specified striking.

ii. Claims 35 and 36 are clear and definite under 35 U.S.C. §112, second paragraph

Claims 35 and 36 were rejected under 35 U.S.C. §112, second paragraph as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Appellants regard as the invention for specifying the term “improves pulse jet firing reliability”.

Claims 35 and 36 specify a method “wherein the striking improves pulse jet firing reliability, relative to pulse jet firing reliability absent the striking”. It has been held that the fact that claim language, including terms of degree, may not be precise, does not automatically render the claim invalid (Seattle Box Co., v. Industrial Crating & Packing, Inc., 731 F.2d 818, 221 USPQ 568 (Fed. Cir. 1984)). Furthermore, the courts have held that claims that specify words of degree and relational terms do not render a claim fatally indefinite if a standard of measurement is apparent (see for example Lucas Aerospace v. Unison Indus., L.P., 899 F. Supp. 1268, 1273 (D. Del. 1995) “when the patentee uses relative language in the patent claims, the relative language must have a point of reference for comparison”).

Claims 35 and 36 specify a standard of reference, namely pulse jet firing absent the striking. One of skill in the art would be able to determine whether the pulse jet firing were improved with striking as compared to pulse jet firing absent the striking. In fact, the specification provides exemplary parameters that may be used for this comparison. The specification notes that reliability may be in terms of a failure of a drop to be dispensed when it is intended to be dispensed, the dispensation of a drop of incorrect or reduced size, an incompletely deposited region of a fabricated article, and the like (see for example page 2, lines 17-28).

Since one of skill in the art is able to determine whether a drop is deposited from a pulse jet at all when so intended, whether a drop of correct size is deposited from a pulse jet, whether deposited regions of an article are complete, one of skill in the art is able to determine whether the ability of a pulse jet to deposit a drop when it should is improved with striking relative to the absence of striking, whether the ability of a pulse jet to deposit a drop of correct size is improved with striking relative to the absence of striking, whether deposited regions of an article fabricated using a pulse jet with striking is improved with striking relative to the absence of striking. As such, Claims 35 and 36 are clear and definite with respect to the term “improves pulse jet firing reliability” under 35 U.S.C. § 112, second paragraph.

B. Claims 1-12 and 35-40 are patentable over Bares et al. in view of Clark et al.

Claims 1-12 and 35-40 were rejected under 35 U.S.C. §103(a) as being unpatentable over Bares et al. in view of Clark et al. Appellants submits that Claims 1-12 and 35-40 are patentable over Bares et al. in view of Clark et al.

i. Clark et al. is non analogous art

Clark et al. is not a proper reference as Clark et al. is non-analogous art. As stated in the MPEP at 2141.01(a), to rely on a reference under 35 U.S.C. §103, it must be analogous art.

The invention of Clark et al. is in a field that is wholly different field from that of the subject invention. Clark at al. is concerned with clinical analyzers and particularly automated immunoassay analytical systems (col. 18, lines 54-56) and syringes for use with the clinical analyzers. The syringes of Clark et al. are employed to aspirate and dispense fluids to the various pipetting mechanisms of an analytical system (col. 41, lines 55-58). For example, Clark et al. note that “The syringe of the present invention is particularly useful with an automated analytical system which is capable of simultaneously performing two or more assays on a plurality of test samples in a continuous and random access fashion, such as the system described in greater detail herein.” (paragraph bridging cols. 43-44). In other words, the invention of Clark et al. involves performing clinical assays.

However, Appellants’ invention is not in the field of analytical analyzers at all, nor does it involve performing assays. Rather, Appellants’ invention is in the field of pulse jets. More particularly, Appellants’ invention is concerned with fluid dispensing from a pulse jet that includes a chamber and a thermoelectric or piezoelectric ejector in the chamber. Embodiments of Appellants’ invention may be employed in the fabrication of arrays on a substrate surface.

The courts have held that “A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor’s endeavor, it is one which, because of the manner with which it deals, logically would have commended itself to an inventor’s attention in considering his problem.” (see for example In Re Oetiker, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992)) In this regard, the court in In re Oetiker held that the reference at issue was not reasonably pertinent to the particular problem with which the inventor was concerned because it had not been shown that a person of ordinary skill, seeking to solve the problem of the Applicant, would reasonably be motivated to look to the cited reference.

Appellants respectfully submit that a person of ordinary skill, seeking to solve the problem of Appellants, namely unreliability in pulse jet firing, would not reasonably be motivated to look to the analytical analyzer systems of Clark et al. as these analytical analyzer systems are not at all concerned with pulse jet firing reliability. In fact, the mechanism by which an amount of fluid is expelled from a

pulse jet firing includes activation of a pulse jet and particularly the actuation of a thermoelectric or piezoelectric ejector in the chamber of the pulse jet. Such a mechanism, or even an analogous mechanism, is not described in Clark et al. Accordingly, a person of ordinary skill, seeking to solve a problem of pulse jet firing reliability, would not reasonably be expected or motivated to look to analytical systems used for clinical assays.

For at least the reasons described above, Clark et al. is an improper reference as non-analogous art.

ii. a *prima facie* case of obviousness cannot be established

Assuming *arguendo* that Clark et al. is determined to be analogous art, Appellants submit that claims 1-12 and 35-40 are patentable over Bares et al. in view of Clark et al. as a proper *prima facie* case of obviousness cannot be established.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. *In re Fine*, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 21 USPQ2d 1941 (Fed. Cir. 1992). Second, there must be a reasonable expectation of success. *In re Merck & Co., Inc.*, 231 USPQ 375 (Fed. Cir. 1986). Finally, the prior art reference, or references when combined, must teach or suggest all the claim limitations. *In re Royka*, 180 USPQ 580 (CCPA 1974). All three criteria must be met. If any one of these three criteria is not met, a *prima facie* case of obviousness has not been established.

Appellants submit that there is no motivation to combine the references as suggested by the Office with a reasonable expectation of success. Furthermore, even if it were to be determined that motivation is provided to combine the references as suggested by the Office with a reasonable expectation of success, the references fail to teach or suggest all of the claim limitations.

There is no motivation to combine the references with a reasonable expectation of success

Independent Claims 1, 11, 37 and 39, and the claims that depend therefrom, specify a method that includes dispensing drops from a pulse jet and striking the pulse jet at least one time. In making this rejection, the Office relies on Bares et al. in view of Clark et al. and argues that it would be obvious to combine these references to provide the invention as claimed in the subject claims.

Bares et al. is generally directed to an ink jet control system and a method for an ink jet printer. As acknowledged by the Office, Bares et al. do not teach or even suggest striking the ink jet printer at all.

Clark et al. is directed towards a syringe bubble flusher for use with a clinical analyzer. As described below, the invention of Clark et al. does not include striking of any kind. Rather, Clark et al. describe flushing bubbles out of a fluidics system in one manner by providing a cross flow. Specifically, Clark et al. describe that bubbles may be flushed from the fluidics system as follows:

“Pressurized fluid is introduced to the fluid entry port 134 under the control of a two-way solenoid valve 135. The fluid flows into the annulus 138, around both sides of the piston 124, and then exits through the fluid exit port 136. **This cross flow flushes bubbles from the area near the seal 126.**”  
(col. 42, lines 8-13; emphasis added)

Clark et al. further describe that high flow fluid velocities in the annulus between the piston and the bore are provided for dislodging bubbles. Specifically, Clark et al. describe:

“The piston 124 reciprocates inside the bore 128 while the cross flow of fluid through the annulus 138 near the seal 126 continues. This reciprocation causes high fluid flow velocities in the annulus 138 between the piston 124 and the bore 128. **The high velocity of fluid flow dislodges any bubbles that may be adhering to the piston 124 or bore wall 128.** The inward stroke of the piston 124 pushes these dislodged bubbles to the cross flow area where they are swept out of the syringe 122 by the crossflow of fluid.” (col. 42, lines 14-36; emphasis added)

Accordingly, Clark et al. describe bubble flushing from a fluidics system by providing high velocity of fluid flow and flushing bubbles out of the system using cross flow.

There would be no motivation to modify the ink jet printer of Bares et al. to provide the high flow fluid velocities of Clark et al. because to do so would render the Bares et al. ink jet printer inoperable for its intended use. More specifically, to modify the ink jet printer of Bares et al. to provide high flow fluid velocities in the firing chamber as suggested by the Office would cause the fluid to leak or bleed out of the nozzles before being fired, thus rendering the ink jet printer useless. High flow velocity fluid in a print head would imply high pressures on the fluid in the print head which is exactly opposite to the conditions needed for ink jet printing. Where the proposed combination/modification would render the

referenced invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification (See for example, In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)).

As described above and in greater detail below, the invention of Clark et al. does not include striking. However, even if it were determined that the invention of Clark et al. includes striking, to modify the ink jet printer of Bares et al. with any striking of the Clark et al. invention, one would have to selectively adopt particular striking aspects of Clark et al., while selectively ignoring the flushing aspects of Clark et al. because the flushing aspects of Clark et al. would render the invention of Bares et al. inoperable for its intended use. However, under 35 U.S.C. §103(a), references must be taken as a whole in any obviousness rejection (see for example MPEP §2141.02: “A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984)). As there is no apparent motivation for such selective adoption, a rejection for obviousness cannot be established even if it were to be determined that the invention of Clarke et al. taught or suggested striking as claimed in the subject claims.

In the background section of Clark et al. it is noted that tapping a syringe to remove bubbles is known (col. 4, lines 13-15). Clark et al. make clear that such syringe tapping is not only cumbersome, but also does not work well in a syringe.

“Existing syringes fail to provide means for effectively removing such bubbles from the fluidic system. For example, the cumbersome manual practice of tapping the syringe to remove bubbles is well-known.” (col. 4, lines 12-15)

Accordingly, the description of known methods of tapping a syringe fails to provide the requisite motivation to modify the invention of Bares et al. to include striking, as Clark et al. teach that such known syringe tapping is cumbersome and ineffective. As such, Clark et al. actually teach away from tapping a syringe. A prior art reference that “teaches away” from the claimed invention is a significant factor to be considered in determining obviousness. It is improper to combine references where the references teach away from their combination (see for example In re Grasselli, 713 F.2d 731, 218 USPQ 769, 779 (Fed. Cir. 1983)).

Furthermore, one of skill in the art upon reading the description of known syringe tapping in the background section of Clark et al. would not be motivated to combine the references as suggested by the

Office with a reasonable expectation of success. As described above, Clark et al. actually teach that tapping a syringe is not effective. It is noteworthy that the syringe of Clark et al. does not employ tapping at all and instead uses a high velocity flow method. Since Clark et al. teach that tapping a **syringe** is not effective, one would not reasonably expect that striking a **pulse jet** would be effective. Accordingly, the references do not provide a reasonable expectation of success.

At best, Clark et al. may suggest that it would be *obvious to try* tapping the ink jet printer of Bares et al. However, courts have repeatedly held that the application of an “obvious to try” rationale is improper in support of an obviousness rejection (see for example In re O’Farrell, 853 F.2d 894, 7 USPQ2d 1673 (Fed. Cir. 1988); In re Deuel, 51, F.3d 1552 (Fed. Cir. 1995); Novo Industri A/S v. Travenol Laboratories, Inc. 677 F.2d 1202, 215, USPQ 412 (7th Cir. 1982)).

The courts have held that an invention is merely “obvious to try” when the results suggested by the prior art do not create a reasonable expectation of success, and in an “obvious to try” situation, the “prior art gives either no indication of which parameters are critical or no direction as to which of many possible choices is likely to be successful.” (Boehringer Ingelheim Vetmedica, Inc. v. Schering-Plough Corp., 68 F. Supp.2d 508, 534, 535 (D. N.J. 1999), later opinion, 166 F.Supp.2d 19 (D. N.J. 2001), aff’d 320 F.3d 1339, 65 USPQ2d 1961 (Fed. Cir. 2003) citing to Gillette Co., 919 F.2d at 725; and Merck & Co., Inc. v. Biocraft Laboratories, Inc., 984 F.2d 804, 807 (Fed. Cir. 1989) relying on In re O’Farrell, 853 F.2d, 894, 903 (Fed. Cir. 1988)).

As described above, the cited references do not provide any reasonable expectation that modifying the ink jet printer of Bares et al. to include tapping or striking in view of Clark et al. would be successful, especially in view of the teachings of Clark et al. that tapping a syringe is ineffective and the significant differences between a syringe and an ink jet printer. In fact, Clark et al. abandons the idea of tapping a syringe all together and instead the syringe of Clark et al. employs high velocity flushing. Accordingly, the results suggested by the cited references not only fail to provide a reasonable expectation of success, but specifically describe that tapping a syringe, let alone an ink jet printer, is ineffective. Furthermore, the references do not provide any guidance as to which parameters are critical to such tapping or otherwise provide any direction to tapping a syringe or how one would tap a syringe in order to overcome the aspects that make tapping a syringe ineffective. In fact, as noted above, instead of addressing ways in which to effectively tap a syringe, Clark et al. disregard tapping all together and instead employ a syringe that uses a high velocity flushing method as described above. As described

above, a syringe is wholly different apparatus from an ink jet printer as taught in Bares et al. The cited references not only fail to provide any guidance or direction with respect to tapping a syringe, but also fail to provide any guidance as to which parameters would be critical to tapping an ink jet printer or otherwise provide any direction as to how one would tap an ink jet printer in a manner that would be effective, as tapping or any other contacting of an ink jet printer is not described in these references. Accordingly, at best, the cited references suggest that it may be obvious to try tapping the ink jet printer of Bares et al. However, “obviousness” and “obvious to try,” are two distinct concepts and must not be confused (McGinley v. Franklin Sports, Inc., 75 F. Supp.2d 1218, 1227 (D. Kansas 1999)).

Accordingly, for at least the reasons that there is no motivation to combine the cited references as suggested by the Office with a reasonable expectation of success, a proper *prima facie* case of obviousness cannot be made. As such, Appellants respectfully request that the rejection of Claims 1-12 and 37-40 be withdrawn for at least this reason.

The references fail to teach or suggest all of the claim limitations

Independent Claims 1, 11, 37 and 39, and the claims that depend therefrom, specify a method that includes dispensing drops from a pulse jet and striking the pulse jet at least one time. However, the cited references, either alone or in combination, fail to teach or suggest a method that includes striking a pulse jet as claimed in the subject claims.

As described above, Bares et al. is generally directed to an ink jet control system and a method for an ink jet printer. As acknowledged by the Office, Bares et al. do not teach or even suggest striking the ink jet printer at all.

Clark et al. fail to make-up for the deficiencies of Bares et al. The invention of Clark et al. does not include dispensing drops from a pulse jet and striking the pulse jet at least once. Clark et al. is directed towards a syringe bubble flusher for use with a clinical analyzer. The syringe bubble flusher, as well as the method of bubble dislodgement, of Clark et al. is greatly differentiated from the subject invention. For example, Clark et al. describe flushing bubbles out of a fluidics system in one manner by providing a cross flow. Specifically, Clark et al. describe that bubbles may be flushed from the fluidics system as follows:

“Pressurized fluid is introduced to the fluid entry port 134 under the control of a two-way solenoid valve 135. The fluid flows into the annulus 138, around both



sides of the piston 124, and then exits through the fluid exit port 136. **This cross flow flushes bubbles from the area near the seal 126.**" (col. 42, lines 8-13; emphasis added)

Clark et al. further describe that high flow fluid velocities in the annulus between the piston and the bore are provided for dislodging bubbles. Specifically, Clark et al. describe:

"The piston 124 reciprocates inside the bore 128 while the cross flow of fluid through the annulus 138 near the seal 126 continues. This reciprocation causes high fluid flow velocities in the annulus 138 between the piston 124 and the bore 128. **The high velocity of fluid flow dislodges any bubbles that may be adhering to the piston 124 or bore wall 128.** The inward stroke of the piston 124 pushes these dislodged bubbles to the cross flow area where they are swept out of the syringe 122 by the crossflow of fluid." (col. 42, lines 14-36; emphasis added)

Clark et al. also note: "When the piston 124 strokes to its full inward extension, it comes very close to the bore end 130." Thus, Clark et al. make clear that the piston does not come in contact with the end of the bore at all. In other words, Clark et al. explicitly state that striking does not occur and in fact the piston only comes "very close" to the end of the bore.

Accordingly, the invention of Clark et al. is directed to bubble flushing from a fluidics system by providing high velocity of fluid flow and flushing bubbles out of the system using cross flow. The invention of Clark et al. does not include striking of a device, as claimed in the subject claims.

As described above, Clark et al. do describe a known cumbersome and ineffective method of tapping a syringe. However, Clark et al. do not describe tapping or striking a pulse jet at least one time and as noted above, there is no motivation or suggestion to modify the invention of Bares et al. to include the syringe tapping method described in the background section of Clark et al. as Clark et al. actually teach away from such syringe tapping, and do not provide any reasonable expectation of success for modifying the invention of Bares et al. to include a syringe tapping method.

Furthermore, Claim 4 specifies a particular direction in which the claimed device is struck. Specifically, Claim 4 specifies that the housing of the device is struck in the same direction in which drops are ejected from the pulse jet. However, neither of the cited references teaches or suggests such a feature. Bares et al. do not describe striking at all and thus do not teach or suggest a particular direction

of striking. As described above, the invention of Clark et al. also fails to include striking a device as Clark et al. describes using high flow velocities and specifically teaches that striking does not occur. While Clark et al. do describe tapping a syringe, Clark et al. teach that such is ineffective and thus actually teach away from any tapping or striking of a device. Furthermore, the Clark et al. description related to the known method of syringe tapping does not include any description whatsoever of tapping a syringe in any particular direction. As such, Clark et al. also fail to teach or suggest a particular direction of striking a device. As the cited references fail to teach or suggest all of the features of Claim 4 as described above, Claim 4 is patentable over the cited references.

Claims 5-6 specify particular strike rates. In support of the rejection of these claims, the Office acknowledges that Bares et al. in view of Clark et al. do not specifically recite a particular strike rate. The Office argues that “[i]t would have been obvious to one of skill in the art at the time of the invention to modify the modified method of Bares et al. by applying the appropriate strike rate...as found necessary by the operator to increase the efficiency and accuracy of the modified device.”

However, as described above, neither of these references teaches or suggests striking a device as claimed in claims 5 and 6 as Bares et al. do not describe striking at all and the invention of Clark et al. does not include striking a device as Clark et al. describes using high flow velocities and specifically teaches that striking does not occur. While Clark et al. do describe tapping a syringe, Clark et al. teach that such is ineffective and thus actually teach away from any tapping or striking of a device. Furthermore, the Clark et al. description related to the known method of syringe tapping does not include any description whatsoever of any particular tapping rates. Accordingly, there is no reason why one would apply a particular strike rate as argued by the Office, let alone the claimed strike rates of 0.2 to 10 strikes/second (Claim 5) and 1 to 5 strikes/second (Claims 6) as such is not taught or suggested in the cited references. In fact, the Office has not pointed to any reference of record that describes the claimed strike rates, however the Office asserts it would be obvious to apply such strike rates to a modified Bares et al. method. As the cited references fail to teach or suggest all of the features of Claims 5-6 as described above, Claims 5-6 are patentable over the cited references.

Claims 7-8 specify that each strike delivers a particular amount of energy. In support of the rejection of these claims, the Office acknowledges that Bares et al. in view of Clark et al. do not

specifically recite the amount of energy delivered by each strike. The Office argues that “[i]t would have been obvious to one of skill in the art at the time of the invention to modify the modified method of Bares et al. by applying the appropriate energy...as found necessary by the operator to increase the efficiency and accuracy of the modified device.”

However, as described above, neither of these references teaches or suggests striking a device as claimed in Claims 7 and 8 as Bares et al. do not describe striking at all and the invention of Clark et al. does not include striking a device as Clark et al. describes using high flow velocities and specifically teaches that striking does not occur. While Clark et al. do describe tapping a syringe, Clark et al. teach that such is ineffective and thus actually teach away from any tapping or striking of a device. Furthermore, the Clark et al. description related to the known method of syringe tapping does not include any description whatsoever of tapping a syringe to deliver a particular amount of energy. Accordingly, there is no reason why one would modify Bares et al. to include any particular amount of energy delivered by striking, let alone the claimed 10 mJ to 150 mJ (Claim 7) and 50 mJ to 100 mJ (Claim 8). In fact, the Office has not pointed to any reference of record that the claimed 10 mJ to 150 mJ (Claim 7) and 50 mJ to 100 mJ (Claim 8), however the Office asserts it would be obvious to modify Bares et al. to include applied energies of 10 mJ to 150 mJ (Claim 7) and 50 mJ to 100 mJ (Claim 8). As the cited references fail to teach or suggest all of the features of Claims 7-8 as described above, Claims 7-8 are patentable over the cited references.

Claims 12 and 14 specify a method wherein multiple strikes are applied to a pulse jet between the dispensing of drops by the pulse jet. However, neither of the cited references teaches or suggests such a feature. Bares et al. do not describe striking at all and thus do not teach or suggest a method wherein multiple strikes are applied to a pulse jet between the dispensing of drops by the pulse jet. As described above, the invention of Clark et al. also fails to include striking a device as Clark et al. describes using high flow velocities and specifically teaches that striking does not occur. While Clark et al. do describe tapping a syringe, Clark et al. teach that such is ineffective and thus actually teach away from any tapping or striking of a device. Furthermore, the Clark et al. description related to the known method of syringe tapping does not include any description whatsoever of when the described tapping is applied to a syringe and certainly does not describe tapping syringe multiple times between dispensing the syringe contents. As such, Clark et al. also fail to teach or suggest a method wherein multiple strikes are applied to a pulse

jet between the dispensing of drops by the pulse jet. As the cited references fail to teach or suggest all of the features of Claim 4 as described above, Claim 4 is patentable over the cited references.

Claims 35 and 36 specify that the striking improves pulse jet firing reliability relative to pulse jet firing absent striking. However, neither of the cited references teaches or suggests such a feature. Bares et al. do not describe striking at all and thus do not teach or suggest a method that includes striking a pulse jet wherein the striking improves pulse jet firing reliability relative to pulse jet firing absent striking. As described above, the invention of Clark et al. also fails to include striking a device as Clark et al. describes using high flow velocities and specifically teaches that striking does not occur. While Clark et al. do describe tapping a syringe, Clark et al. teach that such is ineffective and thus actually teach away from any tapping or striking of a device. As such, Clark et al. also fail to teach or suggest a method that includes striking a pulse jet wherein the striking improves pulse jet firing reliability relative to pulse jet firing absent striking. . As the cited references fail to teach or suggest all of the features of Claims 35 and 36 as described above, Claims 35 and 36 are patentable over the cited references.

For at least the reasons that the cited references fail to teach or suggest all of the claim limitations, a proper *prima facie* case of obviousness cannot be made. As such, Appellants respectfully request that the rejection of Claims 1-12 and 37-40 be withdrawn for at least this reason.

C. Claims 13-14 and 41-42 are patentable over Bares et al. in view of Clark et al. and in further view of Ellson et al.

Claims 13-14 and 41-42 were rejected under 35 U.S.C. §103(a) as being unpatentable over Bares et al. in view of Clark et al. and in further view of Ellson et al. Appellants submit that Claims 13-14 and 41-42 are patentable over Bares et al. in view of Clark et al. and in further view of Ellson et al. for reasons analogous to those described above with respect to the rejection of Claims 1-12 and 35-40 under 35 U.S.C. §103(a) as being unpatentable over Bares et al. in view of Clark et al.

Claims 13-14 depend from Claim 11 and Claims 41-42 depend from Claim 39 and thus Claims 13-14 and 41-42 specify a method of fabricating an array of chemical moieties on a substrate that includes dispensing drops from a pulse jet and intermittently striking the pulse jet multiple times.

As described above, there is no motivation to combine the references as suggested by the Office with a reasonable expectation of success because Clark et al. describe that known methods of tapping a syringe are cumbersome and ineffective and Clark et al. actually teach away from tapping a syringe, let alone tapping or otherwise contacting an ink jet printer according to Bares et al. Furthermore, to modify the invention of Bares et al. with the invention of Clark et al. would render the invention of Bares et al. inoperable for its intended use as the cited references must be taken as a whole. Still further, the cited references alone or in combination fail to teach or suggest all of the claim limitations, as neither reference teaches or suggest striking a pulse jet at all, let alone intermittently striking a pulse jet multiple times as claimed in Claims 13-14 and 41-42. Ellson et al. fails to make up for the deficiencies of Bares et al. and Clark et al. as Ellson et al. is directed to a focused energy acoustic method and device for generating droplets of immiscible fluid and is cited by the Office for teaching a dispensing device that dispenses droplets such as droplets of DNA onto a substrate surface to form an array. Ellson et al. do not teach or suggest a method that includes dispensing drops from a pulse jet and striking the pulse jet.

Accordingly, for at least the reasons described above, a proper *prima facie* case of obviousness cannot be made. As such, the Applicant respectfully requests that the rejection of Claims 13-14 and 41-42 be withdrawn.

## SUMMARY

### Conclusion as to the rejections under 35 U.S.C. §112, second paragraph

- Claims 1 and 11 are clear and definite under 35 U.S.C. §112, second paragraph with respect to the specified striking. As described above, one of skill in the art would clearly understand the meaning of the claimed striking. Furthermore, the Office is improperly requiring that Appellants specify a mechanism of action of the striking. Accordingly, Claims 1, 11 and 35-36 are clear and definite under 35 U.S.C. §112, second paragraph.
- Claims 35 and 36 are clear and definite with respect to the term “improves firing jet reliability” as one of skill in the art would recognize when firing reliability of a pulse jet is improved. Furthermore, the claims specifically specify a standard by which to

determine improved firing jet reliability, namely pulse jet firing reliability absent striking. Accordingly, Claims 35-36 are clear and definite under 35 U.S.C. §112, second paragraph.

Conclusion as to the rejections under 35 U.S.C. §103

- Claims 1-12 and 35-40 are patentable under 35 U.S.C. §103(a) over Bares et al. in view of Clark et al. As described above, there is no motivation to combine the references as suggested by the Office with a reasonable expectation of success because Clark et al. describe that known methods of tapping a syringe are cumbersome and ineffective and Clark et al. actually teach away from tapping a syringe, let alone an ink jet printer of Bares et al. Furthermore, to modify the invention of Bares et al. with the invention of Clark et al. would render the invention of Bares et al. inoperable for its intended use as the cited references must be taken as a whole. Still further, the cited references alone or in combination fail to teach or suggest all of the claim limitations, namely a method that includes striking a pulse jet.
- Claim 4 is patentable under 35 U.S.C. §103(a) over Bares et al. in view of Clark et al. for reasons described above and because the cited references fail to teach or suggest striking a housing in the same direction in which drops are ejected from a pulse jet.
- Claims 5 and 6 are patentable under 35 U.S.C. §103(a) over Bares et al. in view of Clark et al. for reasons described above and because the cited references fail to teach or suggest any particular strike rate, let alone the strike rates of 0.2 to 10 strikes/second (Claims 5) or 1 to 5 strikes/second (Claim 6).
- Claims 7 and 8 are patentable under 35 U.S.C. §103(a) over Bares et al. in view of Clark et al. for reasons described above and because the cited references fail to teach or suggest any particular amount of energy delivered by striking, let alone wherein each strike delivers between 10 mJ to 150 mJ (Claim 7) or between 50 mJ to 100 mJ (Claim 8).

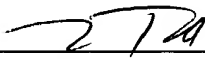
- Claims 12 and 40 are patentable under 35 U.S.C. §103(a) over Bares et al. in view of Clark et al. for reasons described above and because the cited references fail to teach or suggest a method that includes applying multiple strikes to a pulse jet between the dispensing of drops by a pulse jet.
- Claims 35 and 36 are patentable under 35 U.S.C. §103(a) over Bares et al. in view of Clark et al. for reasons described above and because the cited references fail to teach or suggest a method that includes striking a pulse jet, wherein the striking improves pulse jet reliability relative to pulse jet firing reliability absent striking.
- Claims 13-14 and 41-42 are patentable under 35 U.S.C. §103(a) over Bares et al. in view of Clark et al. and in further view of Ellson et al. for reasons described above including that there is no motivation to combine the references as suggested by the Office with a reasonable expectation of success because Clark et al. describe that known methods of tapping a syringe are cumbersome and ineffective and Clark et al. actually teach away from tapping a syringe, let alone an ink jet printer of Bares et al. Furthermore, to modify the invention of Bares et al. with the invention of Clark et al. would render the invention of Bares et al. inoperable for its intended use as the cited references must be taken as a whole. Still further, the cited references alone or in combination fail to teach or suggest all of the claim limitations, namely a method that includes striking a pulse jet.

**RELIEF REQUESTED**

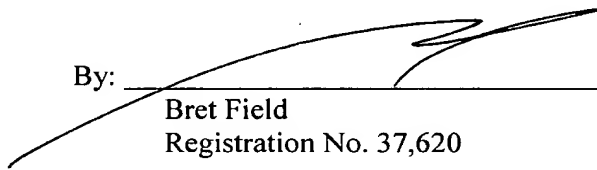
Appellants respectfully request that the rejection of Claims 1, 11 and 35-36 under 35 U.S.C. §112, second paragraph, and the rejection of claims 1-12 and 35-42 under 35 U.S.C. §103 be reversed, and that the application be remanded to the Examiner with instructions to issue a Notice of Allowance.

Respectfully submitted,  
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**APPENDIX OF APPEALED CLAIMS**

1. A method comprising dispensing drops from a pulse jet and striking the pulse jet at least once, wherein the pulse jet comprises a chamber and a thermoelectric or piezoelectric ejector in the chamber.
2. A method according to claim 1 wherein the pulse jet is struck intermittently multiple times.
3. The method of claim 2 wherein the pulse jet includes a housing enclosing a chamber and having a discharge opening for drops, and wherein the housing is struck on an outside surface with a member.
4. The method according to claim 3 wherein the housing is struck in a same direction in which drops are ejected from the pulse jet.
5. The method of claim 3 wherein the chamber is struck at a rate of 0.2 to 10 strikes/second.
6. The method of claim 3 wherein the chamber is struck at a rate of 1 to 5 strikes/second.
7. The method according to claim 3 wherein each strike delivers between 10 mJ to 150 mJ.
8. The method according to claim 3 wherein each strike delivers between 50 mJ to 100 mJ.

9. The method according to claim 2 wherein the pulse jet includes a thermoelectric ejector in the chamber.
10. The method according to claim 2 wherein the pulse jet includes a piezoelectric ejector in the chamber.
11. A method of fabricating an array of chemical moieties on a substrate, comprising:  
dispensing drops from a pulse jet onto the substrate so as to form the array; and  
intermittently striking the pulse jet multiple times;  
wherein the pulse jet comprises a chamber and a thermoelectric or piezoelectric ejector in the chamber.
12. A method according to claim 11 wherein multiple strikes are applied between the dispensing of drops by the pulse jet.
13. A method according to claim 11 wherein the chemical moieties are polynucleotides of different sequences.
14. A method according to claim 13 wherein the polynucleotides are DNA.
35. A method according to claim 1 wherein the striking improves pulse jet firing reliability, relative to pulse jet firing absent the striking.

36. A method according to claim 11 wherein the striking improves pulse jet firing reliability, relative to pulse jet firing absent the striking.
37. A method comprising dispensing drops from a pulse jet and striking the pulse jet at least once, wherein the pulse jet comprises a rigid chamber.
38. A method according to claim 1 wherein the pulse jet is struck intermittently multiple times.
39. A method of fabricating an array of chemical moieties on a substrate, comprising:  
dispensing drops from a pulse jet onto the substrate so as to form the array; and  
intermittently striking the pulse jet multiple times;  
wherein the pulse jet comprises a rigid chamber.
40. A method according to claim 39 wherein multiple strikes are applied between the dispensing of drops by the pulse jet.
41. A method according to claim 39 wherein the chemical moieties are polynucleotides of different sequences.
42. A method according to claim 41 wherein the polynucleotides are DNA.